Administrative Rules of Montana Currentness
Title 17. Environmental Quality
Chapter 30. Water Quality
Sub-chapter 5. Mixing Zones in Surface and Ground Water

➡ 17. 30. 517. STANDARD MIXING ZONES FOR GROUND WATER

(1) The following criteria apply to determine which discharges qualify for a standard ground water mixing zone:

(a) A standard ground water mixing zone is generally applicable in unconfined aquifers, but may not be appropriate for semi-confined or confined aquifers or in aquifers where ground water moves through fractures.

(b) Disposal systems that discharge to ground water through infiltration, drainfields, injection through a disposal well, leakage from an impoundment, see page from a land application area, or other methods may qualify for a standard mixing zone.

(c) To determine if the discharge qualifies for a standard ground water mixing zone, the person proposing the discharge must estimate the anticipated concentration of pollutants at the downgradient boundary of the mixing zone (aquatic life standards do not apply in ground water). If the estimated concentration meets the nonsignificance criteria at the boundary of the mixing zone, as specified in ARM Title 17, chapter 30, subchapter 7, the discharge qualifies for a standard mixing zone.

(d) The estimation required in (c), must be based on a calculation of the volume of water moving through a standard cross-section of aquifer. The calculated volume of water moving through the aquifer cross-section is hypothetically mixed with the known volume and concentration of the discharge to determine the resulting concentration at the boundary of the mixing zone. The recommended method to determine the resulting concentration at the boundary of a standard ground water mixing zone is described below:

(i) Computations of the volume of ground water available for mixing are based on the equation: Q = KIA, where:

(A) Q = volume of flow;

(B) K = hydraulic conductivity;

(C) I = gradient; and

(D) A = aquifer cross-section area.

(ii) Values for hydraulic conductivity (K) and gradient (I) may be obtained Irom field observations or estimated from other sources.

(iii) A specific depth and width are necessary to determine the aquifer cross-section area (A) for a standard mixing zone. The aquifer cross-section area prescribed by the following lengths is used as the area (A) in the equation:

(A) The depth of a standard ground water mixing zone extends from the top of the water table beneath the source down to 15 feet below the water table;

(B) The width of a standard mixing zone is equal to the width of the source plus the distance determined by the tangent of 5° times the length of the mixing zone on both sides of the source;

(iv) It is assumed that mixing between the discharge and the receiving ground water is complete at the aquifer cross-section area at the standard distance downgradient from the source.

(v) It is also assumed that pollutants discharged from the source do not change in volume or concentration as they migrate through the unsaturated zone down to the water table.

(vi) The concentration of the parameter in the ground water must be measured to determine the existing load present in the ground water. The calculated volume of ground water with a measured concentration is hypothetically mixed with the known volume and concentration of the discharge using the following procedure:

(A) Volume of ground water times the concentration of the parameter = existing load;

(B) Volume of discharge times the concentration of the parameter = waste load; and

(C) (Existing load + waste load)/total volume = resulting concentration.

(vii) If the resulting concentration does not exceed the nonsignificance criteria specified in ARM Title 17, chapter 30, subchapter 7, for new or increased sources at the mixing zone boundary, a standard mixing zone may be granted

(viii) The downgradient boundary of the standard mixing zone extends

(A) 100 feet for a single family septic system drainfield in towns or subdivisions where individual lots are less than two acres in size.

(B) 200 feet for a single family septic system in subdivisions of five to 10 acres where lots are two acres in size or larger;

(C) For subdivisions with centralized water service, to the exterior boundaries of the contiguous surrounding undeveloped land, if development of that land is prohibited in perpetuity and title evidence of this fact is provided to the department.

(D) 500 feet for any other source of waste discharging into ground water;

(ix) Monitoring may be required at the downgradient boundary of the mixing zone to measure compliance for a ground water mixing zone established for other than a single family septic system drainfield, if there is an overriding site-specific impact-related reason to require monitoring and the mixing zone is within 500 feet of surface water, another ground water mixing zone, or a drinking water well, or if there is some other overriding site-specific, impact-related reason to require monitoring.

(History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 1994 MAR p. 2136, Eff. 8/12/94; TRANS, from DHES, 1996 MAR p. 1499.)